REMARKS/ARGUMENTS

Claim Amendments

The Applicant has amended claims 1, 22 and 36. Applicant respectfully submits no new matter has been added. Accordingly, claims 1-31 and 33-36 are pending in the application. Favorable reconsideration of the application is respectfully requested in view of the foregoing amendments and the following remarks.

Response to Arguments

The Applicant agrees with the Examiner regarding part 5A. In Part 5B of the Detailed Action it is noted that timing when messages are sent is not a novel functional aspect of the invention. The Applicant has amended claim 1 to more clearly claim the present invention and one of the changes is the limitation that two registration reply messages are sent simultaneously; from the base node to the mobile node and from the base node to the old care-of address. As discussed below, the significance of sending two messages simultaneously provides advantages not available to the individual prior art references, i.e., reduced bandwidth and reduced binding requirements. It is respectfully submitted that the reference portion in the prior art regarding time when messages are sent are simply describing the "bi-casting" process in paragraph [0084] and in paragraph [0091]. The multiple reply messages reference disclosed in the Mobile IPv4 does not use deregistration _and_ registration reply messages.

Claim Rejections – 35 U.S.C. § 103

Claims 1-46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee (US 6,539,225B1) in view of Tiedemann, Jr. et al, et al. (US 5,870,427A) and C. E. Perkins et al. "Route Optimization in Mobile IP", draft-ietf-mobileip-optim-08.txt (Feb. 25, 1999). The Applicant respectfully traverses the rejection of these claims.

The Lee reference is cited for sending two registration reply messages, a RR to the new care-of address and a deregistration reply message to the old care of address. The Lee reference discloses providing seamless handoff by requiring simultaneous

bindings and by using bi-casting, i.e., duplicating the communication content received from the correspondent nodes (see column 5 lines 43 – 47).

The Tiedemann reference is cited for teaching a handoff starting time. Tiedemann discloses performing a preliminary time alignment in analog before performing a handoff between analog mode and digital mode. However, Tiedemann does not describe how the seamless handoff of user data takes place in an IP network.

The Lee reference performs a registration to a new sub-network router and the Lee deregistration from the old sub-network router is different from deregistration provided by the Applicant's invention. As noted in the Detailed Action, Lee does not use information from the lower layer, making a seamless handoff more difficult because by not using information from the lower layer detection of the required time of handoff is too slow. The Applicant respectfully directs the Examiner to amended claim 1.

1. (Currently Amended) A method of seamlessly handing off a mobile node from an old sub-network router to a new sub-network router in an Internet Protocol based wireless access network, comprising:

obtaining a handoff starting time from a lower layer complying with Open Systems Interconnections (OSI) model;

using information from the lower layer of the OSI model to notify the mobile node that a connection with the old sub-network router will be discarded within a predetermined amount of time;

obtaining a new care-of address for the mobile node from the new sub-network router;

sending a request message from the mobile node to a base node via the new sub-network router requesting a new binding;

creating a new care-of address binding in the base node;

simultaneously issuing two registration reply messages, one from the base node to the mobile node wherein a registration reply message is sent to the new care-of address via the new sub-network router indicating that the new care-of address binding has been created and a deregistration reply message is sent from the base node to the old care-of address via the old sub-network router notifying the mobile node that binding with the old care-of address has been removed; and

utilizing the deregistration reply message to synchronize a transfer of old care-of address data packets stored on the old sub-network router to the mobile node. (emphasis added)

The Applicant respectfully submits that the Lee and Tiedemann references fail to disclose or teach the above emphasized limitations; either individually or in combination.

The Lee reference discloses a registration reply (RR) message being sent. Then the multi-route (i.e., bi-casting) tunneling taught by Lee begins and continues as long as necessary to ensure that the handoff procedure has completed. The Old Foreign Agent (28) is then deregistered by the home agent (column 6, lines 1-2). Lee also discloses "[W]hen handoff of the mobile wireless node 14 actually occurs in the mobile wireless system, the communication content from the home agent 26 is immediately available at the New BSS 24." (Col. 5, lines 53-56). This refers to the communication content from home agent 26 that is available at the new BSS. The Detailed Action indicates that this portion of Lee implies that the transfer of old care-of address data packets is a synchronizing step. The Applicant respectfully disagrees. Because Lee uses multi-route tunneling, the home agent maintains both mobility bindings and duplicates the communication content received from the correspondent (col. 5, lines 36-47). The Applicant respectfully submits that this is more of a parallel operation by sending duplicate content down two paths than an operation of synchronizing care-of address data transfer of a single content from the old care of address to the mobile node as in the Applicant's invention.

The Lee reference accomplishes a seamless handoff by duplicating (bi-casting) the content, i.e., replicating all user data packets and sending one copy to the old sub-network router and another copy of the content to the new sub-network router. In contrast to Lee, the content in the Applicant's invention is not duplicated but sent to the old care-of address.

The main advantage of the Applicant's invention compared to the Lee reference is that the present invention is more efficient, since there is no additional (duplicated) network bandwidth required during the duration of a disruption. Furthermore, the present invention does not require the establishment and maintenance of simultaneous bindings as disclosed in the Lee reference.

As disclosed in the Tiedemann reference, the exact handoff time command is sent after the mobile station is instructed to begin time alignment (this is preliminary to

the handoff command). (col. 8, lines 33-47) In Tiedemann a preliminary time alignment in analog is performed before beginning a handoff between analog mode and digital mode. In contrast to the Tiedemann time alignment, the Applicant's present invention in a digital network discloses that the seamless handoff is provided by sending just one content carried by old care-of address data packets (i.e., data packets that use as destination address the old care of address) and by synchronizing the nodes using either the DRR (De-Registration Reply) or (DBA) Deregistration Binding Acknowledgement messages.

In the Applicant's invention, if the mobile node does not receive the DRR or DBA before the wireless connectivity with the old sub-network router deteriorates too badly, then the Mobile node instructs the old sub-network router to send all its stored old care of address data packets to the new sub-network router (i.e., claim 7). In this way no additional (duplicated) network bandwidth is required during the disruption. Additionally, as stated above the present invention does not require establishing and maintaining simultaneous bindings as in Lee.

The Lee reference and the Tiedemann reference both lack the limitation of simultaneously sending two messages, including a deregistration message (as described above), to the mobile node. This being the case, the Applicant respectfully requests the withdrawal of the rejection of amended independent claim 1.
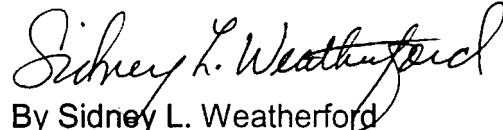
Claims 22 and 36 are analogous to claim 1 and contain similar limitations. The Applicant respectfully requests the withdrawal of the rejection of these amended claims. Claims 2-21, 23-35 and 37-46 depend from the amended independent claims and recite further limitations in combination with the novel elements of the respective independent claims. The allowance of claims 1-31 and 33-46 is respectfully requested.

CONCLUSION

In view of the foregoing remarks, the Applicant believes all of the claims currently pending in the Application to be in a condition for allowance. The Applicant, therefore, respectfully requests that the Examiner withdraw all rejections and issue a Notice of Allowance for all pending claims.

The Applicant requests a telephonic interview if the Examiner has any questions or requires any additional information that would further or expedite the prosecution of the Application.

Respectfully submitted,

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